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Secrets to Keeping Lean as a Fighting Machine

Deuster/Kemmer/Tubbs/Zeno

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Overview

- Carbohydrates and Glycogen
- Proteins
- Responses to Protein Intake
- Vitamins and Minerals
- Fueling the Fighting Machine

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Afraid of Carbohydrates??

- **Effects of Low CHO Intak**
  - **Fatigue**
  - **Poor sleep patterns**
  - **Poor performance**
  - **Irritability**
  - **Musculoskeletal injuries**

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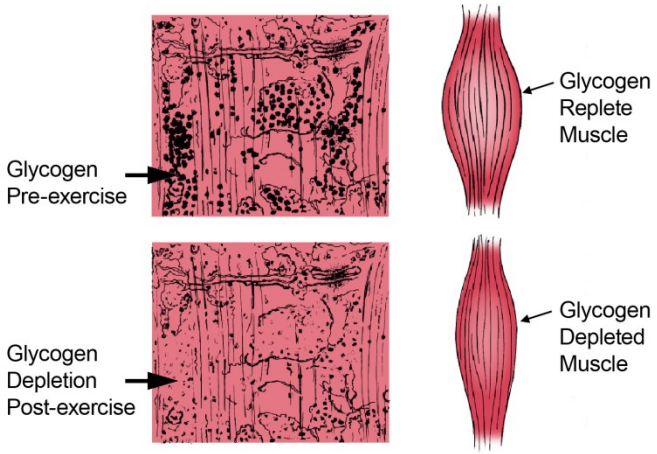
Importance of Glycogen

- **Storage form of CHO in liver and muscle**
- **Primary source of energy for muscles and brain during prolonged activities**
- **Every 100 grams of glycogen is actually 33 g glycogen and 66 g water**
- **Poor eating habits and prolonged exercise will deplete glycogen and cause exhaustion**



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Importance of Glycogen

- **The timing and frequency of CHO intake at various times of the day are crucial for glycogen repletion**
  - **CHO should be ingested to sustain glycogen:**
    - ***Immediately after exercise***
    - ***At various times before exercise (breakfast)***
    - ***At multiple intervals throughout the day***
- **Frequent ingestion of CHO will ensure a readily available supply of glycogen**

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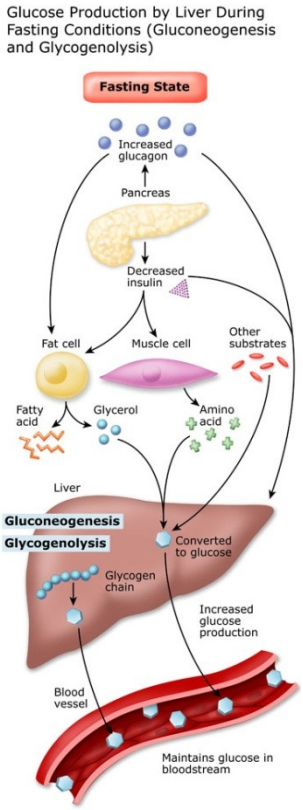
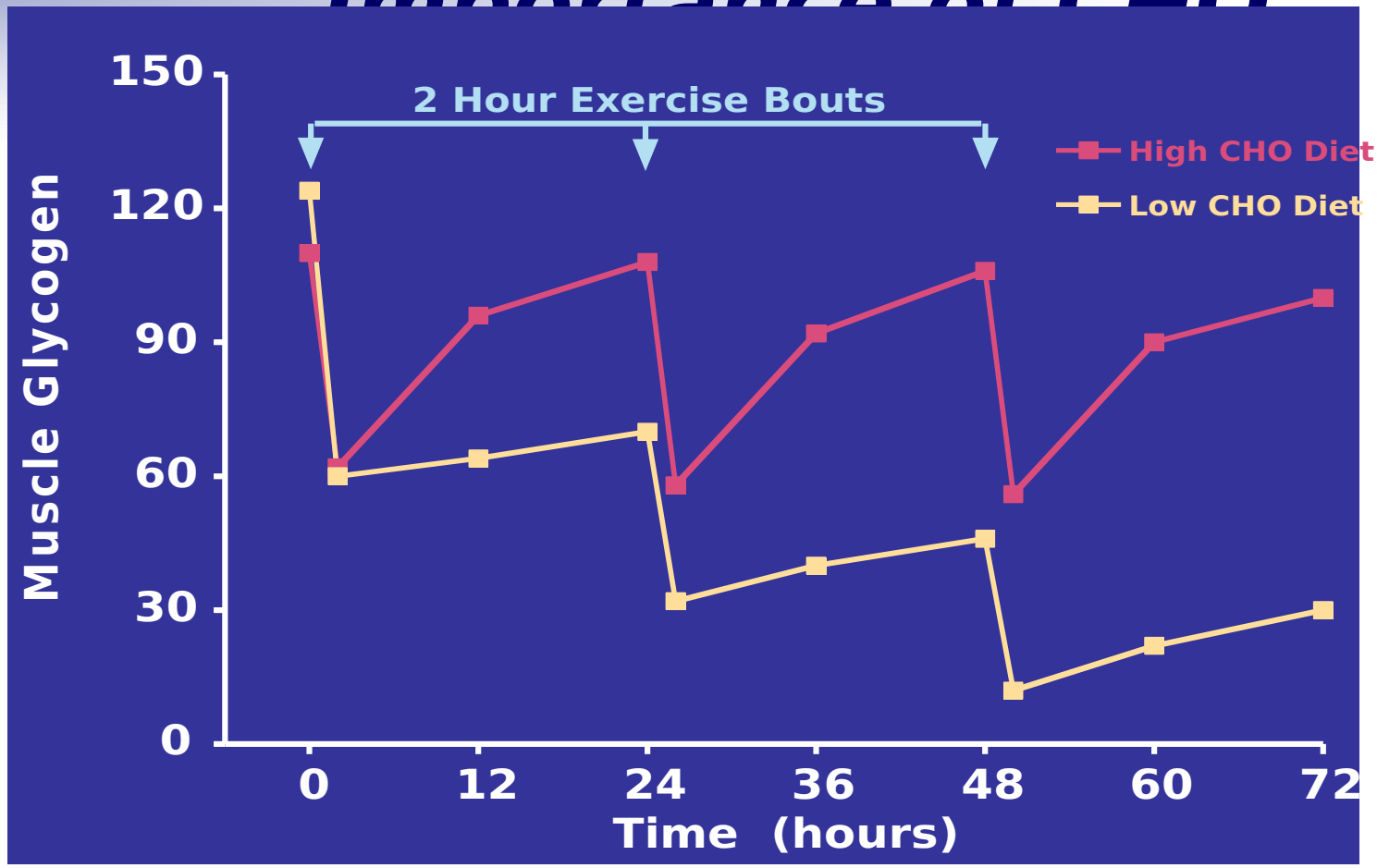
Muscle Glycogen Depletion

- **Eat 2.5–6 grams of CHO per pound body weight daily to replete glycogen stores**
- **A minimum of 400 grams of CHO should be consumed each day to maintain adequate glycogen stores**
- **50–70% of daily energy intake should come from CHO**



Glycogen Depletion and Diet:

Importance of CHO



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Protein Needs

- **SOF personnel are rarely low in protein, unless deployed to austere areas**
- **Maintaining positive energy balance is more important than increasing protein intake during training**
- **Protein intake should range between 0.6-0.9 grams per lb body weight/day**
- **MORE is not always better!**

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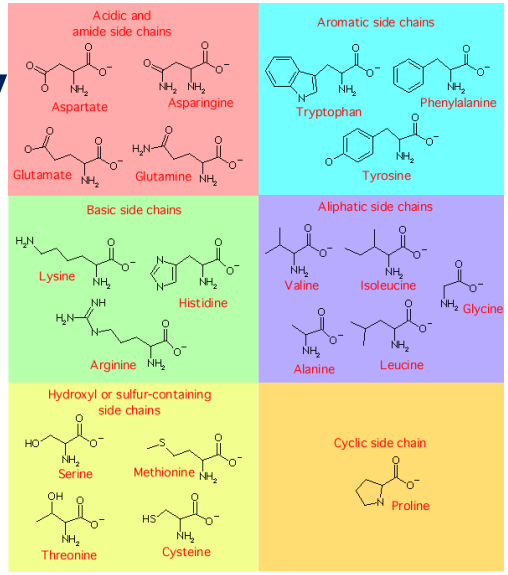
Factors Determining Body Responses to Protein

- **Protein quality:**
  - **Amino acid composition is more important than protein quantity**
- **Metabolic state:**
  - **Muscles take up amino acids from milk proteins (whey and casein) faster than from soy proteins after exercise**
  - **Casein protein produces a strong anabolic environment at rest**



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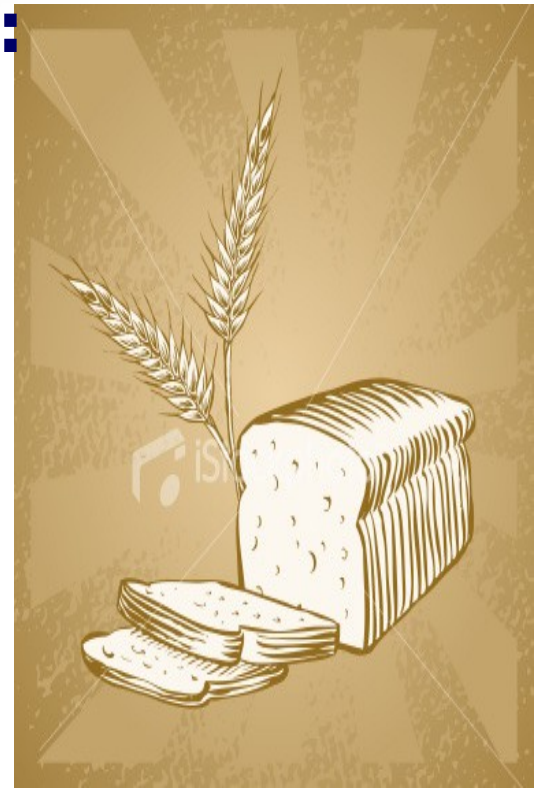
Factors Determining Body Responses to Protein

- **Presence of other nutrients:**
  - **Ingesting protein with CHO improves the use of amino acids**
- **Timing of ingestion relative to exercise:**
  - **Critical window is within 45 minutes after exercise**
- **Interactions among all factors above**



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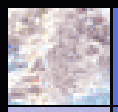
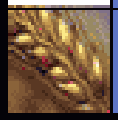
Protein Type		Protein Digestibility Corrected Amino Acid Score (PDCAAS) [1]	Amino Acid Score	Protein Efficiency Ratio (PER) [2]	Biological Value (BV)	Protein Digestibility % (PD)
	Whey Protein	1.00	1.14	3.2	100	99
	Whole Egg	1.00	1.21	3.8	88-100	98
	Casein	1.00	1.00	2.5	80	99
	Soy Protein Concentrate	1.00	0.99	2.2	74	95
	Beef Protein	0.92	0.94	2.9	80	98
	Wheat Gluten	0.25	0.47	NA	54	91

Source:
[1] Protein Quality Evaluation, Report of the Joint FAO/WHO Consultation
[2] Reference Manual for U.S. Whey Products, 2nd Edition, U.S. Dairy Export Council

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Vitamin and Mineral Needs

- **Training demands may increase nutrient needs 1.5 to 3 times more than recommended for the average man**
  - **A variety of colorful and healthy foods will help meet vitamin and min**
- **Foods rich in natural anti-oxidants are recommended for endurance-related activi**

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Food Sources of Antioxidants

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Vitamin C
Orange juice
Grapefruit juice
Red/yellow peppers
Broccoli
Orange
Strawberries
Cauliflower
Papaya
Dried berries

Vitamin E
Sunflower seeds
Wheat germ
Almonds
Peanuts
Spinach
Olive oil
Tomato
Kiwi
Mango

Carotenoids
Carrots
Spinach
Cantaloupe
Broccoli
Winter squash
Dried apricots
Sweet potatoes
Mango
Pumpkin

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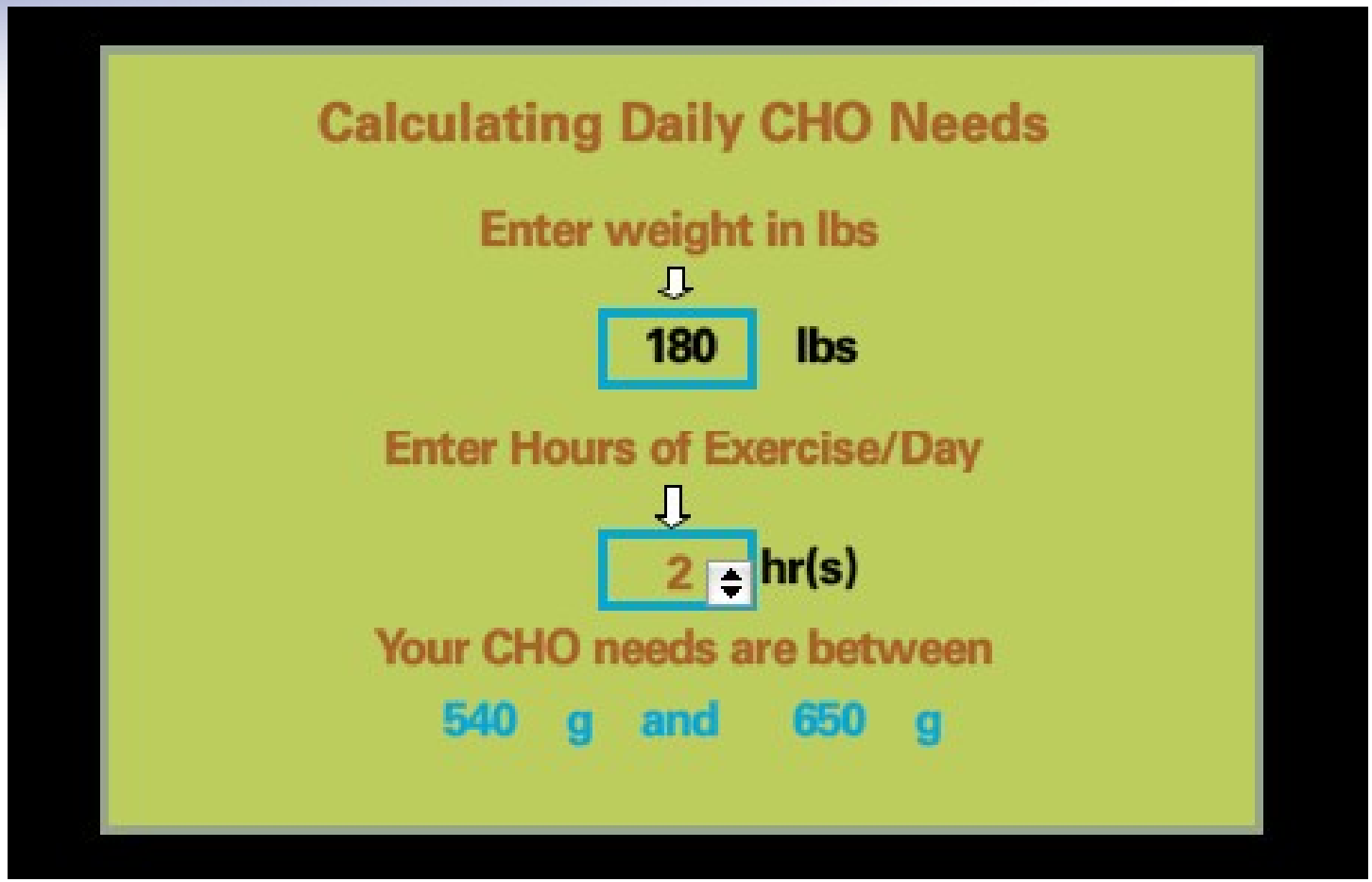
Calculate CHO Needs According to Body Weight



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Nutrition Requirements

Determining Grams of Carbohydrate, Protein, and Fat Based on Energy Needs

Enter total calories needed	Enter desired % of each category		
4,500	Calories from 50% CHO	563	grams of CHO**
	Calories from 20% Protein	225	grams of Protein
	Calories from 30% Fat	150	grams of Fat
	100%		

Recommendations:

Carbohydrate	50% - 70%	of daily calories
Protein	10% - 35%	of daily calories
Fat	10% - 35%	of daily calories

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Fueling the Fighting Machine

- Consume approximately 50 grams of CHO with 10-12 grams of protein immediately after training
- The maximum amount of CHO/day is 650 grams
- Eat small, high CHO meals (30 to 60 grams) every few hours between training sessions

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Fueling the Fighting Machine

- **Never forget to eat breakfast!**
- **Keep a log of all CHO foods eaten for several days to see if CHO intake is high enough**
- **Read food labels to determine CHO content and serving sizes**
- **Consume foods that are easily acceptable and absorbed by the gut**

Fueling the Fighting Machine

- **Some foods may cause GI distress when eaten during exercise**
- **Dietary fiber intake should be limited during endurance events to avoid GI discomfort**
- **All foods for replenishing energy stores during sustained operations and exercise sessions should be safe and familiar**

Key Points

- **Eating the right amount of CHO is one of the most important fueling strategies**
  - **Improper eating and low glycogen stores impair performance and increase risk of musculoskeletal injuries**
- **Choose colorful foods to ensure an adequate intake of vitamins and minerals**
- **Individual food preferences should be determined to avoid GI distress during training and operations**